A Simple Text File for Curing Rainbow Blindness

by

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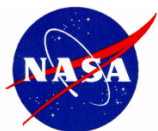# Introduction

- Large, multi-component thermal models present a post-processing challenge.

- Temperatures for many components, with varying requirements, need to be examined.

- False color temperature maps, or rainbows, provide a qualitative assessment of results.

- A fast, quantitative evaluation requires something else.

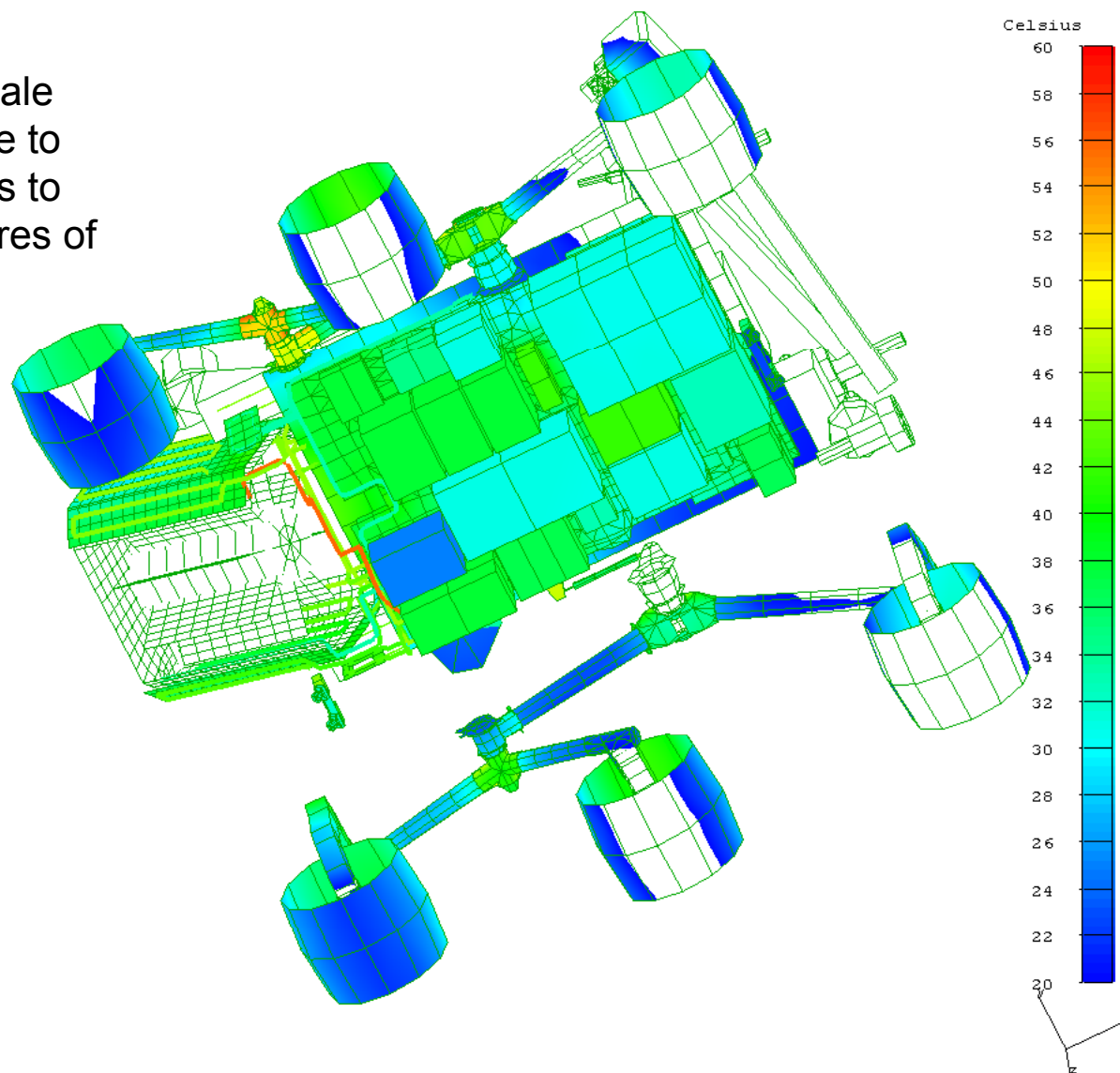# Do your temperature predictions meet requirements?

Area of interest
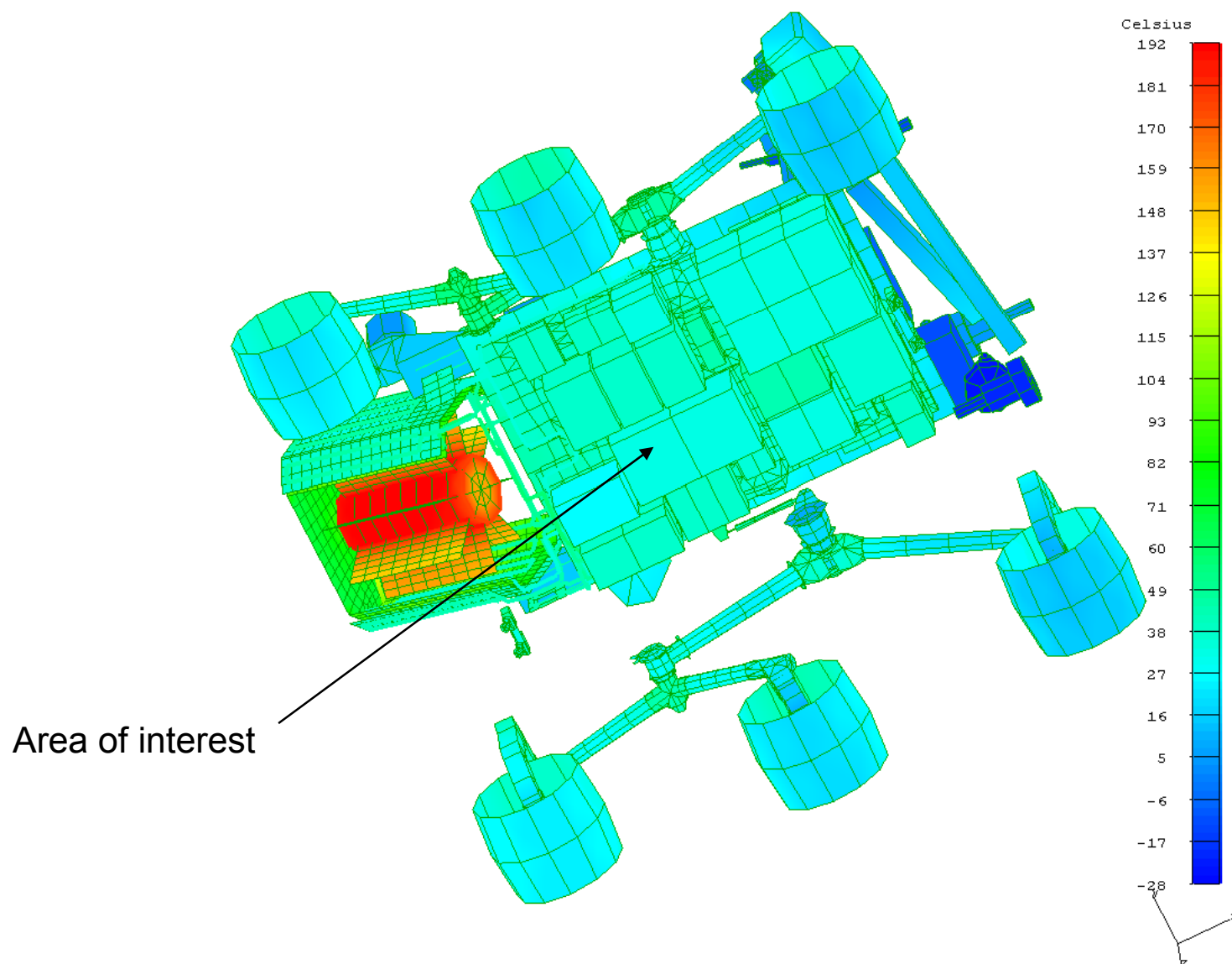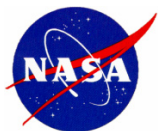
Adjusting the display scale helps, but you may have to make many adjustments to measure the temperatures of all your components.
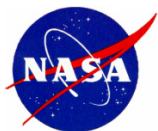
Warm areas are always
red- cool areas are
always blue
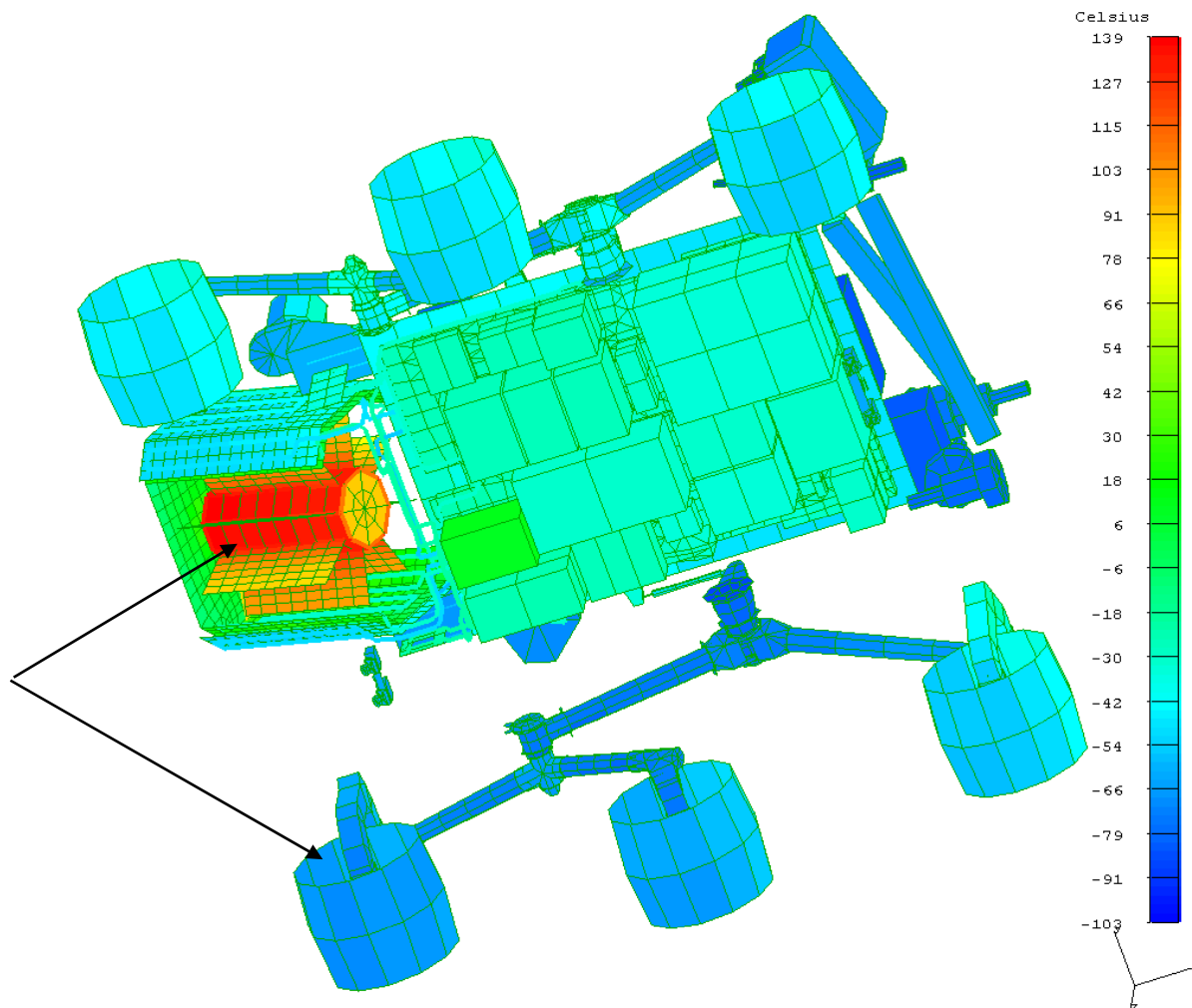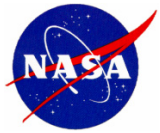
- Your thermal design must satisfy requirements for every component- and there are many.

- In the design phase you verify by analysis, usually with a large thermal model.

- After a run, you need to find all the max's and min's and compare to the individual requirements.

- Scanning every component and adjusting the display scales takes too long.

- You need a fast way to check for requirements compliance.

Use five parameters to evaluate your design

- Name of the component.
- High and low temperature requirements.
- Temperature prediction.
- Does it meet its requirements?
- If it does, how close to the limits is it?

You can get all five with a text file

Prediction, located by proportion to limits

Lower Limit

Upper Limit

Name

Violation

```
TextPad - [C:\...\rover\20070910\...\...._2_3_Summer_Stycast_3...
File  Edit  Search  View  Tools  Macros  Configure  Window  Help

     Time 353301.
6264 RAMP_TO_RIPA               -40.                  23.          50.
6265 BRACKET_TO_DANDE           -40.                  16.          50.
6266 RAMP_TO_ELECTRA            -35.                  18.          50.
6267 RAMP_TO_SSPA               -35.                  19.          50.
6268 SDST INTERFACE PLAT        -35.                  18.          50.
6269 RAMP_TO_RPA                -40.                  20.          50.
6270 RAMP_TO_RPAM1              -40.                  19.          50.
6271 RAMP_TO_SAM                -40.                  16.          50.
6272 RAMP_TO_DEA                -40.                  16.          50.
6273 RAMP_TO_RMCA               -40.                  19.          50.
6274 RAMP_TO_RCEA               -40.                  18.          50.
6275 RAMP_TO_RCEB               -40.                  17.          50.
6276 RAMP_TO_IMU                -39.                  17.          51.
6277 RAMP_TO_CHEMIN             -40.                  17.          50.
6278 RAMP_TO_REMS               -40.                  16.          50.
6279 RAMP_TO_APXS               -45.                  16.          55.
6280 RAMP_TO_CHEMCAM            -40.                  17.          50.
6281 R_BATTERY                  -20.                               30.    31.
6282 BRACKET_TO_DANPNG          -40.            12.                50.
6283 UHF                       -128.     -100.         3.          70.
6284 RPFA                       -40.     -24.                      50.
6285 HX_HP                      -90.                  36.    86.  100.
6286 HX_CP                      -90.          -14.   34.         100.
6287 SHRS                      -100.                  35.         100.
6288 RTG CYL 6X8 FOR FIN         65.                       177.   185.
6289 RTG_FIN_ROOT                65.                       175.   185.
6290

                              6283    1    Read Ovr Block Sync Rec Caps
```

How can you get your own subroutine?

- You can write a simple Fortran subroutine that picks a tab position by proportion to temperature.

- JPL's subroutine[1] builds a character string out of the names and temperatures.
  - Error checking is built in.
  - The subroutine evolved over several years.

- Writing your own code does give you control over format and content.

1. Saeger, M., "Custom Post Processing Techniques for I-DEAS TMG Thermal Analysis Results", PLM World 2007

Conclusion

- Rainbows make pretty pictures but you can go faster with a text file.